

SEQUENCE LISTING

<110> Buchter-Larsen, et al.

<120> A PROCESS OF PREPARING AN ANTI-OXIDANT

<130> 674509-2020

<140> 09/423,126

<141> 1999-11-05

<150> PCT/IB98/00708

<151> 1998-05-06

<150> GB 9709161.5

<151> 1997-05-06

<160> 12

<170> PatentIn version 3.0

<210> 1

<211> 1088

<212> PRT

<213> Unknown

<220>

<223> fungus sp. or fungus infected gracilariopsis sp.

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Met Phe Ser Thr Leu Ala Phe Val Ala Pro Ser Ala Leu Gly Ala Ser
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Thr Phe Val Gly Ala Glu Val Arg Ser Asn Val Arg Ile His Ser Ala
20 25 30

Phe Pro Ala Val His Thr Ala Thr Arg Lys Thr Asn Arg Leu Asn Val
35 40 45

Ser Met Thr Ala Leu Ser Asp Lys Gln Thr Ala Thr Ala Gly Ser Thr
50 55 60

Asp Asn Pro Asp Gly Ile Asp Tyr Lys Thr Tyr Asp Tyr Val Gly Val
65 70 75 80

Trp Gly Phe Ser Pro Leu Ser Asn Thr Asn Trp Phe Ala Ala Gly Ser
85 90 95

Ser Thr Pro Gly Gly Ile Thr Asp Trp Thr Ala Thr Met Asn Val Asn
100 105 110

Phe Asp Arg Ile Asp Asn Pro Ser Ile Thr Val Gln His Pro Val Gln
115 120 125

Val Gln Val Thr Ser Tyr Asn Asn Asn Ser Tyr Arg Val Arg Phe Asn
130 135 140

Pro Asp Gly Pro Ile Arg Asp Val Thr Arg Gly Pro Ile Leu Lys Gln															
145				150					155						160
Gln Leu Asp Trp Ile Arg Thr Gln Glu Leu Ser Glu Gly Cys Asp Pro				165					170					175	
Gly Met Thr Phe Thr Ser Glu Gly Phe Leu Thr Phe Glu Thr Lys Asp				180					185					190	
Leu Ser Val Ile Ile Tyr Gly Asn Phe Lys Thr Arg Val Thr Arg Lys				195					200					205	
Ser Asp Gly Lys Val Ile Met Glu Asn Asp Glu Val Gly Thr Ala Ser				210					215					220	
Ser Gly Asn Lys Cys Arg Gly Leu Met Phe Val Asp Arg Leu Tyr Gly				225					230					235	240
Asn Ala Ile Ala Ser Val Asn Lys Asn Phe Arg Asn Asp Ala Val Lys				245					250					255	
Gln Glu Gly Phe Tyr Gly Ala Gly Glu Val Asn Cys Lys Tyr Gln Asp				260					265					270	
Thr Tyr Ile Leu Glu Arg Thr Gly Ile Ala Met Thr Asn Tyr Asn Tyr				275					280					285	
Asp Asn Leu Asn Tyr Asn Gln Trp Asp Leu Arg Pro Pro His His Asp				290					295					300	
Gly Ala Leu Asn Pro Asp Tyr Tyr Ile Pro Met Tyr Tyr Ala Ala Pro				305					310					315	320
Trp Leu Ile Val Asn Gly Cys Ala Gly Thr Ser Glu Gln Tyr Ser Tyr				325					330					335	
Gly Trp Phe Met Asp Asn Val Ser Gln Ser Tyr Met Asn Thr Gly Asp				340					345					350	
Thr Thr Trp Asn Ser Gly Gln Glu Asp Leu Ala Tyr Met Gly Ala Gln				355					360					365	
Tyr Gly Pro Phe Asp Gln His Phe Val Tyr Gly Ala Gly Gly Gly Met				370					375					380	
Glu Cys Val Val Thr Ala Phe Ser Leu Leu Gln Gly Lys Glu Phe Glu				385					390					395	400
Asn Gln Val Leu Asn Lys Arg Ser Val Met Pro Pro Lys Tyr Val Phe				405					410					415	
Gly Phe Phe Gln Gly Val Phe Gly Thr Ser Ser Leu Leu Arg Ala His				420					425					430	
Met Pro Ala Gly Glu Asn Asn Ile Ser Val Glu Glu Ile Val Glu Gly				435					440					445	

Tyr	Gln	Asn	Asn	Asn	Phe	Pro	Phe	Glu	Gly	Leu	Ala	Val	Asp	Val	Asp		
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Met	Gln	Asp	Asn	Leu	Arg	Val	Phe	Thr	Thr	Lys	Gly	Glu	Phe	Trp	Thr		
465					470					475					480		
Ala	Asn	Arg	Val	Gly	Thr	Gly	Gly	Asp	Pro	Asn	Asn	Arg	Ser	Val	Phe		
				485					490					495			
Glu	Trp	Ala	His	Asp	Lys	Gly	Leu	Val	Cys	Gln	Thr	Asn	Ile	Thr	Cys		
			500					505					510				
Phe	Leu	Arg	Asn	Asp	Asn	Glu	Gly	Gln	Asp	Tyr	Glu	Val	Asn	Gln	Thr		
			515				520					525					
Leu	Arg	Glu	Arg	Gln	Leu	Tyr	Thr	Lys	Asn	Asp	Ser	Leu	Thr	Gly	Thr		
						535					540						
Asp	Phe	Gly	Met	Thr	Asp	Asp	Gly	Pro	Ser	Asp	Ala	Tyr	Ile	Gly	His		
545					550					555					560		
Leu	Asp	Tyr	Gly	Gly	Gly	Val	Glu	Cys	Asp	Ala	Leu	Phe	Pro	Asp	Trp		
				565					570					575			
Gly	Arg	Pro	Asp	Val	Ala	Glu	Trp	Trp	Gly	Asn	Asn	Tyr	Lys	Lys	Leu		
			580					585					590				
Phe	Ser	Ile	Gly	Leu	Asp	Phe	Val	Trp	Gln	Asp	Met	Thr	Val	Pro	Ala		
			595				600					605					
Met	Met	Pro	His	Lys	Ile	Gly	Asp	Asp	Ile	Asn	Val	Lys	Pro	Asp	Gly		
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Asn	Trp	Pro	Asn	Ala	Asp	Asp	Pro	Ser	Asn	Gly	Gln	Tyr	Asn	Trp	Lys		
625				630						635				640			
Thr	Tyr	His	Pro	Gln	Val	Leu	Val	Thr	Asp	Met	Arg	Tyr	Glu	Asn	His		
				645					650				655				
Gly	Arg	Glu	Pro	Met	Val	Thr	Gln	Arg	Asn	Ile	His	Ala	Tyr	Thr	Leu		
			660					665					670				
Cys	Glu	Ser	Thr	Arg	Lys	Glu	Gly	Ile	Val	Glu	Asn	Ala	Asp	Thr	Leu		
			675				680					685					
Thr	Lys	Phe	Arg	Arg	Ser	Tyr	Ile	Ile	Ser	Arg	Gly	Gly	Tyr	Ile	Gly		
690					695						700						
Asn	Gln	His	Phe	Gly	Gly	Met	Trp	Val	Gly	Asp	Asn	Ser	Thr	Thr	Ser		
705					710					715					720		
Asn	Tyr	Ile	Gln	Met	Met	Ile	Ala	Asn	Asn	Ile	Asn	Met	Asn	Met	Ser		
				725				730					735				
Cys	Leu	Pro	Leu	Val	Gly	Ser	Asp	Ile	Gly	Gly	Phe	Thr	Ser	Tyr	Asp		
			740					745					750				

Asn Glu Asn Gln Arg Thr Pro Cys Thr Gly Asp Leu Met Val Arg Tyr
 755 760 765
 Val Gln Ala Gly Cys Leu Leu Pro Trp Phe Arg Asn His Tyr Asp Arg
 770 775 780
 Trp Ile Glu Ser Lys Asp His Gly Lys Asp Tyr Gln Glu Leu Tyr Met
 785 790 795 800
 Tyr Pro Asn Glu Met Asp Thr Leu Arg Lys Phe Val Glu Phe Arg Tyr
 805 810 815
 Arg Trp Gln Glu Val Leu Tyr Thr Ala Met Tyr Gln Asn Ala Ala Phe
 820 825 830
 Gly Lys Pro Ile Ile Lys Ala Ala Ser Met Tyr Asn Asn Asp Ser Asn
 835 840 845
 Val Arg Arg Ala Gln Asn Asp His Phe Leu Leu Gly Gly His Asp Gly
 850 855 860
 Tyr Arg Ile Leu Cys Ala Pro Val Val Trp Glu Asn Ser Thr Glu Arg
 865 870 875 880
 Glu Leu Tyr Leu Pro Val Leu Thr Gln Trp Tyr Lys Phe Gly Pro Asp
 885 890 895
 Phe Asp Thr Lys Pro Leu Glu Gly Ala Met Asn Gly Gly Asp Arg Ile
 900 905 910
 Tyr Asn Tyr Pro Val Pro Gln Ser Glu Ser Pro Ile Phe Val Arg Glu
 915 920 925
 Gly Ala Ile Leu Pro Thr Arg Tyr Thr Leu Asn Gly Glu Asn Lys Ser
 930 935 940
 Leu Asn Thr Tyr Thr Asp Glu Asp Pro Leu Val Phe Glu Val Phe Pro
 945 950 955 960
 Leu Gly Asn Asn Arg Ala Asp Gly Met Cys Tyr Leu Asp Asp Gly Gly
 965 970 975
 Val Thr Thr Asn Ala Glu Asp Asn Gly Lys Phe Ser Val Val Lys Val
 980 985 990
 Ala Ala Glu Gln Asp Gly Gly Thr Glu Thr Ile Thr Phe Thr Asn Asp
 995 1000 1005
 Cys Tyr Glu Tyr Val Phe Gly Gly Pro Phe Tyr Val Arg Val Arg
 1010 1015 1020
 Gly Ala Gln Ser Pro Ser Asn Ile His Val Ser Ser Gly Ala Gly
 1025 1030 1035
 Ser Gln Asp Met Lys Val Ser Ser Ala Thr Ser Arg Ala Ala Leu
 1040 1045 1050

Phe Asn Asp Gly Glu Asn Gly Asp Phe Trp Val Asp Gln Glu Thr
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Asp Ser Leu Trp Leu Lys Leu Pro Asn Val Val Leu Pro Asp Ala
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Val Ile Thr Ile Thr
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 <212> PRT
 <213> Unknown

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 <223> fungus sp. or fungus infected gracilariopsis sp.

<400> 2

Met Tyr Pro Thr Leu Thr Phe Val Ala Pro Ser Ala Leu Gly Ala Arg
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Thr Phe Thr Cys Val Gly Ile Phe Arg Ser His Ile Leu Ile His Ser
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Val Val Pro Ala Val Arg Leu Ala Val Arg Lys Ser Asn Arg Leu Asn
 35 40 45

Val Ser Met Ser Ala Leu Phe Asp Lys Pro Thr Ala Val Thr Gly Gly
 50 55 60

Lys Asp Asn Pro Asp Asn Ile Asn Tyr Thr Thr Tyr Asp Tyr Val Pro
 65 70 75 80

Val Trp Arg Phe Asp Pro Leu Ser Asn Thr Asn Trp Phe Ala Ala Gly
 85 90 95

Ser Ser Thr Pro Gly Asp Ile Asp Asp Trp Thr Ala Thr Met Asn Val
 100 105 110

Asn Phe Asp Arg Ile Asp Asn Pro Ser Phe Thr Leu Glu Lys Pro Val
 115 120 125

Gln Val Gln Val Thr Ser Tyr Lys Asn Asn Cys Phe Arg Val Arg Phe
 130 135 140

Asn Pro Asp Gly Pro Ile Arg Asp Val Asp Arg Gly Pro Ile Leu Gln
 145 150 155 160

Gln Gln Leu Asn Trp Ile Arg Lys Gln Glu Gln Ser Lys Gly Phe Asp
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Pro Lys Met Gly Phe Thr Lys Glu Gly Phe Leu Lys Phe Glu Thr Lys
 180 185 190

Asp Leu Asn Val Ile Ile Tyr Gly Asn Phe Lys Thr Arg Val Thr Arg

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Gly	Thr	Ala	Ile	Ala	Ser	Val	Asn	Glu	Asn	Tyr	Arg	Asn	Asp	Pro	Asp
				245					250					255	
Arg	Lys	Glu	Gly	Phe	Tyr	Gly	Ala	Gly	Glu	Val	Asn	Cys	Glu	Phe	Trp
			260					265					270		
Asp	Ser	Glu	Gln	Asn	Arg	Asn	Lys	Tyr	Ile	Leu	Glu	Arg	Thr	Gly	Ile
		275					280					285			
Ala	Met	Thr	Asn	Tyr	Asn	Tyr	Asp	Asn	Tyr	Asn	Tyr	Asn	Gln	Ser	Asp
	290					295					300				
Leu	Ile	Ala	Pro	Gly	Tyr	Pro	Ser	Asp	Pro	Asn	Phe	Tyr	Ile	Pro	Met
305					310					315					320
Tyr	Phe	Ala	Ala	Pro	Trp	Val	Val	Val	Lys	Gly	Cys	Ser	Gly	Asn	Ser
				325					330					335	
Asp	Glu	Gln	Tyr	Ser	Tyr	Gly	Trp	Phe	Met	Asp	Asn	Val	Ser	Gln	Thr
			340					345					350		
Tyr	Met	Asn	Thr	Gly	Gly	Thr	Ser	Trp	Asn	Cys	Gly	Glu	Glu	Asn	Leu
		355					360					365			
Ala	Tyr	Met	Gly	Ala	Gln	Cys	Gly	Pro	Phe	Asp	Gln	His	Phe	Val	Tyr
	370					375					380				
Gly	Asp	Gly	Asp	Gly	Leu	Glu	Asp	Val	Val	Gln	Ala	Phe	Ser	Leu	Leu
385					390					395					400
Gln	Gly	Lys	Glu	Phe	Glu	Asn	Gln	Val	Leu	Asn	Lys	Arg	Ala	Val	Met
			405						410					415	
Pro	Pro	Lys	Tyr	Val	Phe	Gly	Tyr	Phe	Gln	Gly	Val	Phe	Gly	Ile	Ala
			420					425					430		
Ser	Leu	Leu	Arg	Glu	Gln	Arg	Pro	Glu	Gly	Gly	Asn	Asn	Ile	Ser	Val
		435					440					445			
Gln	Glu	Ile	Val	Glu	Gly	Tyr	Gln	Ser	Asn	Asn	Phe	Pro	Leu	Glu	Gly
	450					455					460				
Leu	Ala	Val	Asp	Val	Asp	Met	Gln	Gln	Asp	Leu	Arg	Val	Phe	Thr	Thr
465						470					475				480
Lys	Ile	Glu	Phe	Trp	Thr	Ala	Asn	Lys	Val	Gly	Thr	Gly	Gly	Asp	Ser
			485						490					495	
Asn	Asn	Lys	Ser	Val	Phe	Glu	Trp	Ala	His	Asp	Lys	Gly	Leu	Val	Cys

500					505					510					
Gln	Thr	Asn	Val	Thr	Cys	Phe	Leu	Arg	Asn	Asp	Asn	Gly	Gly	Ala	Asp
		515					520					525			
Tyr	Glu	Val	Asn	Gln	Thr	Leu	Arg	Glu	Lys	Gly	Leu	Tyr	Thr	Lys	Asn
		530					535					540			
Asp	Ser	Leu	Thr	Asn	Thr	Asn	Phe	Gly	Thr	Thr	Asn	Asp	Gly	Pro	Ser
							550					555			
Asp	Ala	Tyr	Ile	Gly	His	Leu	Asp	Tyr	Gly	Gly	Gly	Gly	Asn	Cys	Asp
				565					570					575	
Ala	Leu	Phe	Pro	Asp	Trp	Gly	Arg	Pro	Gly	Val	Ala	Glu	Trp	Trp	Gly
				580					585					590	
Asp	Asn	Tyr	Ser	Lys	Leu	Phe	Lys	Ile	Gly	Leu	Asp	Phe	Val	Trp	Gln
				595					600					605	
Asp	Met	Thr	Val	Pro	Ala	Met	Met	Pro	His	Lys	Val	Gly	Asp	Ala	Val
												620			
Asp	Thr	Arg	Ser	Pro	Tyr	Gly	Trp	Pro	Asn	Glu	Asn	Asp	Pro	Ser	Asn
							630					635			
Gly	Arg	Tyr	Asn	Trp	Lys	Ser	Tyr	His	Pro	Gln	Val	Leu	Val	Thr	Asp
				645					650					655	
Met	Arg	Tyr	Glu	Asn	His	Gly	Arg	Glu	Pro	Met	Phe	Thr	Gln	Arg	Asn
				660					665					670	
Met	His	Ala	Tyr	Thr	Leu	Cys	Glu	Ser	Thr	Arg	Lys	Glu	Gly	Ile	Val
				675					680					685	
Ala	Asn	Ala	Asp	Thr	Leu	Thr	Lys	Phe	Arg	Arg	Ser	Tyr	Ile	Ile	Ser
							695					700			
Arg	Gly	Gly	Tyr	Ile	Gly	Asn	Gln	His	Phe	Gly	Gly	Met	Trp	Val	Gly
							710					715			
Asp	Asn	Ser	Ser	Ser	Gln	Arg	Tyr	Leu	Gln	Met	Met	Ile	Ala	Asn	Ile
									730					735	
Val	Asn	Met	Asn	Met	Ser	Cys	Leu	Pro	Leu	Val	Gly	Ser	Asp	Ile	Gly
				740					745					750	
Gly	Phe	Thr	Ser	Tyr	Asp	Gly	Arg	Asn	Val	Cys	Pro	Gly	Asp	Leu	Met
				755					760					765	
Val	Arg	Phe	Val	Gln	Ala	Gly	Cys	Leu	Leu	Pro	Trp	Phe	Arg	Asn	His
				770					775					780	
Tyr	Gly	Arg	Leu	Val	Glu	Gly	Lys	Gln	Glu	Gly	Lys	Tyr	Tyr	Gln	Glu
									790					795	
Leu	Tyr	Met	Tyr	Lys	Asp	Glu	Met	Ala	Thr	Leu	Arg	Lys	Phe	Ile	Glu

805					810					815					
Phe	Arg	Tyr	Arg	Trp	Gln	Glu	Val	Leu	Tyr	Thr	Ala	Met	Tyr	Gln	Asn
			820					825					830		
Ala	Ala	Phe	Gly	Lys	Pro	Ile	Ile	Lys	Ala	Ala	Ser	Met	Tyr	Asp	Asn
			835					840					845		
Asp	Arg	Asn	Val	Arg	Gly	Ala	Gln	Asp	Asp	His	Phe	Leu	Leu	Gly	Gly
			850					855					860		
His	Asp	Gly	Tyr	Arg	Ile	Leu	Cys	Ala	Pro	Val	Val	Trp	Glu	Asn	Thr
			865					870					875		880
Thr	Ser	Arg	Asp	Leu	Tyr	Leu	Pro	Val	Leu	Thr	Lys	Trp	Tyr	Lys	Phe
			885					890					895		
Gly	Pro	Asp	Tyr	Asp	Thr	Lys	Arg	Leu	Asp	Ser	Ala	Leu	Asp	Gly	Gly
			900					905					910		
Gln	Met	Ile	Lys	Asn	Tyr	Ser	Val	Pro	Gln	Ser	Asp	Ser	Pro	Ile	Phe
			915					920					925		
Val	Arg	Glu	Gly	Ala	Ile	Leu	Pro	Thr	Arg	Tyr	Thr	Leu	Asp	Gly	Ser
			930					935					940		
Asn	Lys	Ser	Met	Asn	Thr	Tyr	Thr	Asp	Lys	Asp	Pro	Leu	Val	Phe	Glu
			945					950					955		960
Val	Phe	Pro	Leu	Gly	Asn	Asn	Arg	Ala	Asp	Gly	Met	Cys	Tyr	Leu	Asp
			965					970					975		
Asp	Gly	Gly	Ile	Thr	Thr	Asp	Ala	Glu	Asp	His	Gly	Lys	Phe	Ser	Val
			980					985					990		
Ile	Asn	Val	Glu	Ala	Leu	Arg	Lys	Gly	Val	Thr	Thr	Thr	Ile	Lys	Phe
			995					1000					1005		
Ala	Tyr	Asp	Thr	Tyr	Gln	Tyr	Val	Phe	Asp	Gly	Pro	Phe	Tyr	Val	
			1010					1015					1020		
Arg	Ile	Arg	Asn	Leu	Thr	Thr	Ala	Ser	Lys	Ile	Asn	Val	Ser	Ser	
			1025					1030					1035		
Gly	Ala	Gly	Glu	Glu	Asp	Met	Thr	Pro	Thr	Ser	Ala	Asn	Ser	Arg	
			1040					1045					1050		
Ala	Ala	Leu	Phe	Ser	Asp	Gly	Gly	Val	Gly	Glu	Tyr	Trp	Ala	Asp	
			1055					1060					1065		
Asn	Asp	Thr	Ser	Ser	Leu	Trp	Met	Lys	Leu	Pro	Asn	Leu	Val	Leu	
			1070					1075					1080		
Gln	Asp	Ala	Val	Ile	Thr	Ile	Thr								
			1085					1090							

<211> 1066
 <212> PRT
 <213> Unknown

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<223> fungus sp. or fungus infected gracilariopsis sp.

<400> 3

Met	Ala	Gly	Phe	Ser	Asp	Pro	Leu	Asn	Phe	Cys	Lys	Ala	Glu	Asp	Tyr	1	5	10	15
Tyr	Ser	Val	Ala	Leu	Asp	Trp	Lys	Gly	Pro	Gln	Lys	Ile	Ile	Gly	Val	20	25	30	
Asp	Thr	Thr	Pro	Pro	Lys	Ser	Thr	Lys	Phe	Pro	Lys	Asn	Trp	His	Gly	35	40	45	
Val	Asn	Leu	Arg	Phe	Asp	Asp	Gly	Thr	Leu	Gly	Val	Val	Gln	Phe	Ile	50	55	60	
Arg	Pro	Cys	Val	Trp	Arg	Val	Arg	Tyr	Asp	Pro	Gly	Phe	Lys	Thr	Ser	65	70	75	80
Asp	Glu	Tyr	Gly	Asp	Glu	Asn	Thr	Arg	Thr	Ile	Val	Gln	Asp	Tyr	Met	85	90	95	
Ser	Thr	Leu	Ser	Asn	Lys	Leu	Asp	Thr	Tyr	Arg	Gly	Leu	Thr	Trp	Glu	100	105	110	
Thr	Lys	Cys	Glu	Asp	Ser	Gly	Asp	Phe	Phe	Thr	Phe	Ser	Ser	Lys	Val	115	120	125	
Thr	Ala	Val	Glu	Lys	Ser	Glu	Arg	Thr	Arg	Asn	Lys	Val	Gly	Asp	Gly	130	135	140	
Leu	Arg	Ile	His	Leu	Trp	Lys	Ser	Pro	Phe	Arg	Ile	Gln	Val	Val	Arg	145	150	155	160
Thr	Leu	Thr	Pro	Leu	Lys	Asp	Pro	Tyr	Pro	Ile	Pro	Asn	Val	Ala	Ala	165	170	175	
Ala	Glu	Ala	Arg	Val	Ser	Asp	Lys	Val	Val	Trp	Gln	Thr	Ser	Pro	Lys	180	185	190	
Thr	Phe	Arg	Lys	Asn	Leu	His	Pro	Gln	His	Lys	Met	Leu	Lys	Asp	Thr	195	200	205	
Val	Leu	Asp	Ile	Val	Lys	Pro	Gly	His	Gly	Glu	Tyr	Val	Gly	Trp	Gly	210	215	220	
Glu	Met	Gly	Gly	Ile	Gln	Phe	Met	Lys	Glu	Pro	Thr	Phe	Met	Asn	Tyr	225	230	235	240
Phe	Asn	Phe	Asp	Asn	Met	Gln	Tyr	Gln	Gln	Val	Tyr	Ala	Gln	Gly	Ala	245	250	255	

Leu Asp Ser Arg Glu Pro Leu Tyr His Ser Asp Pro Phe Tyr Leu Asp
 260 265 270
 Val Asn Ser Asn Pro Glu His Lys Asn Ile Thr Ala Thr Phe Ile Asp
 275 280 285
 Asn Tyr Ser Gln Ile Ala Ile Asp Phe Gly Lys Thr Asn Ser Gly Tyr
 290 295 300
 Ile Lys Leu Gly Thr Arg Tyr Gly Gly Ile Asp Cys Tyr Gly Ile Ser
 305 310 315 320
 Ala Asp Thr Val Pro Glu Ile Val Arg Leu Tyr Thr Gly Leu Val Gly
 325 330 335
 Arg Ser Lys Leu Lys Pro Arg Tyr Ile Leu Gly Ala His Gln Ala Cys
 340 345 350
 Tyr Gly Tyr Gln Gln Glu Ser Asp Leu Tyr Ser Val Val Gln Gln Tyr
 355 360 365
 Arg Asp Cys Lys Phe Pro Leu Asp Gly Ile His Val Asp Val Asp Val
 370 375 380
 Gln Asp Gly Phe Arg Thr Phe Thr Thr Asn Pro His Thr Phe Pro Asn
 385 390 395 400
 Pro Lys Glu Met Phe Thr Asn Leu Arg Asn Asn Gly Ile Lys Cys Ser
 405 410 415
 Thr Asn Ile Thr Pro Val Ile Ser Ile Asn Asn Arg Glu Gly Gly Tyr
 420 425 430
 Ser Thr Leu Leu Glu Gly Val Asp Lys Lys Tyr Phe Ile Met Asp Asp
 435 440 445
 Arg Tyr Thr Glu Gly Thr Ser Gly Asn Ala Lys Asp Val Arg Tyr Met
 450 455 460
 Tyr Tyr Gly Gly Gly Asn Lys Val Glu Val Asp Pro Asn Asp Val Asn
 465 470 475 480
 Gly Arg Pro Asp Phe Lys Asp Asn Tyr Asp Phe Pro Ala Asn Phe Asn
 485 490 495
 Ser Lys Gln Tyr Pro Tyr His Gly Gly Val Ser Tyr Gly Tyr Gly Asn
 500 505 510
 Gly Ser Ala Gly Phe Tyr Pro Asp Leu Asn Arg Lys Glu Val Arg Ile
 515 520 525
 Trp Trp Gly Met Gln Tyr Lys Tyr Leu Phe Asp Met Gly Leu Glu Phe
 530 535 540
 Val Trp Gln Asp Met Thr Thr Pro Ala Ile His Thr Ser Tyr Gly Asp
 545 550 555 560

Met	Lys	Gly	Leu	Pro	Thr	Arg	Leu	Leu	Val	Thr	Ser	Asp	Ser	Val	Thr	565	570	575
Asn	Ala	Ser	Glu	Lys	Lys	Leu	Ala	Ile	Glu	Thr	Trp	Ala	Leu	Tyr	Ser	580	585	590
Tyr	Asn	Leu	His	Lys	Ala	Thr	Trp	His	Gly	Leu	Ser	Arg	Leu	Glu	Ser	595	600	605
Arg	Lys	Asn	Lys	Arg	Asn	Phe	Ile	Leu	Gly	Arg	Gly	Ser	Tyr	Ala	Gly	610	615	620
Ala	Tyr	Arg	Phe	Ala	Gly	Leu	Trp	Thr	Gly	Asp	Asn	Ala	Ser	Asn	Trp	625	630	635
Glu	Phe	Trp	Lys	Ile	Ser	Val	Ser	Gln	Val	Leu	Ser	Leu	Gly	Leu	Asn	645	650	655
Gly	Val	Cys	Ile	Ala	Gly	Ser	Asp	Thr	Gly	Gly	Phe	Glu	Pro	Tyr	Arg	660	665	670
Asp	Ala	Asn	Gly	Val	Glu	Glu	Lys	Tyr	Cys	Ser	Pro	Glu	Leu	Leu	Ile	675	680	685
Arg	Trp	Tyr	Thr	Gly	Ser	Phe	Leu	Leu	Pro	Trp	Leu	Arg	Asn	His	Tyr	690	695	700
Val	Lys	Lys	Asp	Arg	Lys	Trp	Phe	Gln	Glu	Pro	Tyr	Ser	Tyr	Pro	Lys	705	710	715
His	Leu	Glu	Thr	His	Pro	Glu	Leu	Ala	Asp	Gln	Ala	Trp	Leu	Tyr	Lys	725	730	735
Ser	Val	Leu	Glu	Ile	Cys	Arg	Tyr	Tyr	Val	Glu	Leu	Arg	Tyr	Ser	Leu	740	745	750
Ile	Gln	Leu	Leu	Tyr	Asp	Cys	Met	Phe	Gln	Asn	Val	Val	Asp	Gly	Met	755	760	765
Pro	Ile	Thr	Arg	Ser	Met	Leu	Leu	Thr	Asp	Thr	Glu	Asp	Thr	Thr	Phe	770	775	780
Phe	Asn	Glu	Ser	Gln	Lys	Phe	Leu	Asp	Asn	Gln	Tyr	Met	Ala	Gly	Asp	785	790	795
Asp	Ile	Leu	Val	Ala	Pro	Ile	Leu	His	Ser	Arg	Lys	Glu	Ile	Pro	Gly	805	810	815
Glu	Asn	Arg	Asp	Val	Tyr	Leu	Pro	Leu	Tyr	His	Thr	Trp	Tyr	Pro	Ser	820	825	830
Asn	Leu	Arg	Pro	Trp	Asp	Asp	Gln	Gly	Val	Ala	Leu	Gly	Asn	Pro	Val	835	840	845
Glu	Gly	Gly	Ser	Val	Ile	Asn	Tyr	Thr	Ala	Arg	Ile	Val	Ala	Pro	Glu	850	855	860

Asp Tyr Asn Leu Phe His Ser Val Val Pro Val Tyr Val Arg Glu Gly
 865 870 875 880
 Ala Ile Ile Pro Gln Ile Glu Val Arg Gln Trp Thr Gly Gln Gly Gly
 885 890 895
 Ala Asn Arg Ile Lys Phe Asn Ile Tyr Pro Gly Lys Asp Lys Glu Tyr
 900 905 910
 Cys Thr Tyr Leu Asp Asp Gly Val Ser Arg Asp Ser Ala Pro Glu Asp
 915 920 925
 Leu Pro Gln Tyr Lys Glu Thr His Glu Gln Ser Lys Val Glu Gly Ala
 930 935 940
 Glu Ile Ala Lys Gln Ile Gly Lys Lys Thr Gly Tyr Asn Ile Ser Gly
 945 950 955 960
 Thr Asp Pro Glu Ala Lys Gly Tyr His Arg Lys Val Ala Val Thr Gln
 965 970 975
 Thr Ser Lys Asp Lys Thr Arg Thr Val Thr Ile Glu Pro Lys His Asn
 980 985 990
 Gly Tyr Asp Pro Ser Lys Glu Val Gly Asp Tyr Tyr Thr Ile Ile Leu
 995 1000 1005
 Trp Tyr Ala Pro Gly Phe Asp Gly Ser Ile Val Asp Val Ser Lys
 1010 1015 1020
 Thr Thr Val Asn Val Glu Gly Gly Val Glu His Gln Val Tyr Lys
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 Asn Ser Asp Leu His Thr Val Val Ile Asp Val Lys Glu Val Ile
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 Gly Thr Thr Lys Ser Val Lys Ile Thr Cys Thr Ala Ala
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 Tyr Ala Ala Ala Lys Gly Trp Ser Gly Pro Gln Lys Ile Ile Arg Tyr
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 Asp Gln Thr Pro Pro Gln Gly Thr Lys Asp Pro Lys Ser Trp His Ala
 35 40 45

Val	Asn	Leu	Pro	Phe	Asp	Asp	Gly	Thr	Met	Cys	Val	Val	Gln	Phe	Val	50	55	60	
Arg	Pro	Cys	Val	Trp	Arg	Val	Arg	Tyr	Asp	Pro	Ser	Val	Lys	Thr	Ser	65	70	75	80
Asp	Glu	Tyr	Gly	Asp	Glu	Asn	Thr	Arg	Thr	Ile	Val	Gln	Asp	Tyr	Met	85	90	95	
Thr	Thr	Leu	Val	Gly	Asn	Leu	Asp	Ile	Phe	Arg	Gly	Leu	Thr	Trp	Val	100	105	110	
Ser	Thr	Leu	Glu	Asp	Ser	Gly	Glu	Tyr	Tyr	Thr	Phe	Lys	Ser	Glu	Val	115	120	125	
Thr	Ala	Val	Asp	Glu	Thr	Glu	Arg	Thr	Arg	Asn	Lys	Val	Gly	Asp	Gly	130	135	140	
Leu	Lys	Ile	Tyr	Leu	Trp	Lys	Asn	Pro	Phe	Arg	Ile	Gln	Val	Val	Arg	145	150	155	160
Leu	Leu	Thr	Pro	Leu	Val	Asp	Pro	Phe	Pro	Ile	Pro	Asn	Val	Ala	Asn	165	170	175	
Ala	Thr	Ala	Arg	Val	Ala	Asp	Lys	Val	Val	Trp	Gln	Thr	Ser	Pro	Lys	180	185	190	
Thr	Phe	Arg	Lys	Asn	Leu	His	Pro	Gln	His	Lys	Met	Leu	Lys	Asp	Thr	195	200	205	
Val	Leu	Asp	Ile	Ile	Lys	Pro	Gly	His	Gly	Glu	Tyr	Val	Gly	Trp	Gly	210	215	220	
Glu	Met	Gly	Gly	Ile	Glu	Phe	Met	Lys	Glu	Pro	Thr	Phe	Met	Asn	Tyr	225	230	235	240
Phe	Asn	Phe	Asp	Asn	Met	Gln	Tyr	Gln	Gln	Val	Tyr	Ala	Gln	Gly	Ala	245	250	255	
Leu	Asp	Ser	Arg	Glu	Pro	Leu	Tyr	His	Ser	Asp	Pro	Phe	Tyr	Leu	Asp	260	265	270	
Val	Asn	Ser	Asn	Pro	Glu	His	Lys	Asn	Ile	Thr	Ala	Thr	Phe	Ile	Asp	275	280	285	
Asn	Tyr	Ser	Gln	Ile	Ala	Ile	Asp	Phe	Gly	Lys	Thr	Asn	Ser	Gly	Tyr	290	295	300	
Ile	Lys	Leu	Gly	Thr	Arg	Tyr	Gly	Gly	Ile	Asp	Cys	Tyr	Gly	Ile	Ser	305	310	315	320
Ala	Asp	Thr	Val	Pro	Glu	Ile	Val	Arg	Leu	Tyr	Thr	Gly	Leu	Val	Gly	325	330	335	
Arg	Ser	Lys	Leu	Lys	Pro	Arg	Tyr	Ile	Leu	Gly	Ala	His	Gln	Ala	Cys	340	345	350	

Tyr Gly Tyr Gln Gln Glu Ser Asp Leu His Ala Val Val Gln Gln Tyr
 355 360 365
 Arg Asp Thr Lys Phe Pro Leu Asp Gly Leu His Val Asp Val Asp Phe
 370 375 380
 Gln Asp Asn Phe Arg Thr Phe Thr Thr Asn Pro Ile Thr Phe Pro Asn
 385 390 395 400
 Pro Lys Glu Met Phe Thr Asn Leu Arg Asn Asn Gly Ile Lys Cys Ser
 405 410 415
 Thr Asn Ile Thr Pro Val Ile Ser Ile Arg Asp Arg Pro Asn Gly Tyr
 420 425 430
 Ser Thr Leu Asn Glu Gly Tyr Asp Lys Lys Tyr Phe Ile Met Asp Asp
 435 440 445
 Arg Tyr Thr Glu Gly Thr Ser Gly Asp Pro Gln Asn Val Arg Tyr Ser
 450 455 460
 Phe Tyr Gly Gly Gly Asn Pro Val Glu Val Asn Pro Asn Asp Val Trp
 465 470 475 480
 Ala Arg Pro Asp Phe Gly Asp Asn Tyr Asp Phe Pro Thr Asn Phe Asn
 485 490 495
 Cys Lys Asp Tyr Pro Tyr His Gly Gly Val Ser Tyr Gly Tyr Gly Asn
 500 505 510
 Gly Thr Pro Gly Tyr Tyr Pro Asp Leu Asn Arg Glu Glu Val Arg Ile
 515 520 525
 Trp Trp Gly Leu Gln Tyr Glu Tyr Leu Phe Asn Met Gly Leu Glu Phe
 530 535 540
 Val Trp Gln Asp Met Thr Thr Pro Ala Ile His Ser Ser Tyr Gly Asp
 545 550 555 560
 Met Lys Gly Leu Pro Thr Arg Leu Leu Val Thr Ala Asp Ser Val Thr
 565 570 575
 Asn Ala Ser Glu Lys Lys Leu Ala Ile Glu Ser Trp Ala Leu Tyr Ser
 580 585 590
 Tyr Asn Leu His Lys Ala Thr Phe His Gly Leu Gly Arg Leu Glu Ser
 595 600 605
 Arg Lys Asn Lys Arg Asn Phe Ile Leu Gly Arg Gly Ser Tyr Ala Gly
 610 615 620
 Ala Tyr Arg Phe Ala Gly Leu Trp Thr Gly Asp Asn Ala Ser Thr Trp
 625 630 635 640
 Glu Phe Trp Lys Ile Ser Val Ser Gln Val Leu Ser Leu Gly Leu Asn
 645 650 655

Gly	Val	Cys	Ile	Ala	Gly	Ser	Asp	Thr	Gly	Gly	Phe	Glu	Pro	Ala	Arg		
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Thr	Glu	Ile	Gly	Glu	Glu	Lys	Tyr	Cys	Ser	Pro	Glu	Leu	Leu	Ile	Arg		
		675					680					685					
Trp	Tyr	Thr	Gly	Ser	Phe	Leu	Leu	Pro	Trp	Leu	Arg	Asn	His	Tyr	Val		
		690				695					700						
Lys	Lys	Asp	Arg	Lys	Trp	Phe	Gln	Glu	Pro	Tyr	Ala	Tyr	Pro	Lys	His		
705					710					715					720		
Leu	Glu	Thr	His	Pro	Glu	Leu	Ala	Asp	Gln	Ala	Trp	Leu	Tyr	Lys	Ser		
				725					730					735			
Val	Leu	Glu	Ile	Cys	Arg	Tyr	Trp	Val	Glu	Leu	Arg	Tyr	Ser	Leu	Ile		
			740					745					750				
Gln	Leu	Leu	Tyr	Asp	Cys	Met	Phe	Gln	Asn	Val	Val	Asp	Gly	Met	Pro		
		755					760					765					
Leu	Ala	Arg	Ser	Met	Leu	Leu	Thr	Asp	Thr	Glu	Asp	Thr	Thr	Phe	Phe		
	770					775					780						
Asn	Glu	Ser	Gln	Lys	Phe	Leu	Asp	Asn	Gln	Tyr	Met	Ala	Gly	Asp	Asp		
785					790					795					800		
Ile	Leu	Val	Ala	Pro	Ile	Leu	His	Ser	Arg	Asn	Glu	Val	Pro	Gly	Glu		
				805					810					815			
Asn	Arg	Asp	Val	Tyr	Leu	Pro	Leu	Phe	His	Thr	Trp	Tyr	Pro	Ser	Asn		
			820					825					830				
Leu	Arg	Pro	Trp	Asp	Asp	Gln	Gly	Val	Ala	Leu	Gly	Asn	Pro	Val	Glu		
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Gly	Gly	Ser	Val	Ile	Asn	Tyr	Thr	Ala	Arg	Ile	Val	Ala	Pro	Glu	Asp		
	850					855					860						
Tyr	Asn	Leu	Phe	His	Asn	Val	Val	Pro	Val	Tyr	Ile	Arg	Glu	Gly	Ala		
865					870					875					880		
Ile	Ile	Pro	Gln	Ile	Gln	Val	Arg	Gln	Trp	Ile	Gly	Glu	Gly	Gly	Pro		
				885					890					895			
Asn	Pro	Ile	Lys	Phe	Asn	Ile	Tyr	Pro	Gly	Lys	Asp	Lys	Glu	Tyr	Val		
			900					905					910				
Thr	Tyr	Leu	Asp	Asp	Gly	Val	Ser	Arg	Asp	Ser	Ala	Pro	Asp	Asp	Leu		
		915					920					925					
Pro	Gln	Tyr	Arg	Glu	Ala	Tyr	Glu	Gln	Ala	Lys	Val	Glu	Gly	Lys	Asp		
		930				935					940						
Val	Gln	Lys	Gln	Leu	Ala	Val	Ile	Gln	Gly	Asn	Lys	Thr	Asn	Asp	Phe		
945					950					955					960		

Ser Ala Ser Gly Ile Asp Lys Glu Ala Lys Gly Tyr His Arg Lys Val
 965 970 975

Ser Ile Lys Gln Glu Ser Lys Asp Lys Thr Arg Thr Val Thr Ile Glu
 980 985 990

Pro Lys His Asn Gly Tyr Asp Pro Ser Lys Glu Val Gly Asn Tyr Tyr
 995 1000 1005

Thr Ile Ile Leu Trp Tyr Ala Pro Gly Phe Asp Gly Ser Ile Val
 1010 1015 1020

Asp Val Ser Gln Ala Thr Val Asn Ile Glu Gly Gly Val Glu Cys
 1025 1030 1035

Glu Ile Phe Lys Asn Thr Gly Leu His Thr Val Val Val Asn Val
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Lys Glu Val Ile Gly Thr Thr Lys Ser Val Lys Ile Thr Cys Thr
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Thr Ala
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Thr Phe Val Gly Ala Asp Ile Arg Ser Gly Ile Arg Ile Gln Ser Ala
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Leu Pro Ala Val Arg Asn Ala Val Arg Arg Ser Lys His Tyr Asn Val
 35 40 45

Ser Met Thr Ala Leu Ser Asp Lys Gln Thr Ala Ile Ser Ile Gly Pro
 50 55 60

Asp Asn Pro Asp Gly Ile Asn Tyr Gln Asn Tyr Asp Tyr Ile Pro Val
 65 70 75 80

Ala Gly Phe Thr Pro Leu Ser Asn Thr Asn Trp Tyr Ala Ala Gly Ser
 85 90 95

Ser Thr Pro Gly Gly Ile Thr Asp Trp Thr Ala Thr Met Asn Val Lys
 100 105 110

Phe Asp Arg Ile Asp Asn Pro Ser Tyr Ser Asn Asn His Pro Val Gln

115					120					125					
Ile	Gln	Val	Thr	Ser	Tyr	Asn	Asn	Asn	Ser	Phe	Arg	Ile	Arg	Phe	Asn
130						135					140				
Pro	Asp	Gly	Pro	Ile	Arg	Asp	Val	Ser	Arg	Gly	Pro	Ile	Leu	Lys	Gln
145						150					155				160
Gln	Leu	Thr	Trp	Ile	Arg	Asn	Gln	Glu	Leu	Ala	Gln	Gly	Cys	Asn	Pro
				165					170					175	
Asn	Met	Ser	Phe	Ser	Pro	Glu	Gly	Phe	Leu	Ser	Phe	Glu	Thr	Lys	Asp
			180					185					190		
Leu	Asn	Val	Ile	Ile	Tyr	Gly	Asn	Cys	Lys	Met	Arg	Val	Thr	Lys	Lys
		195					200					205			
Asp	Gly	Tyr	Leu	Val	Met	Glu	Asn	Asp	Glu	Cys	Asn	Ser	Gln	Ser	Asp
	210					215					220				
Gly	Asn	Lys	Cys	Arg	Gly	Leu	Met	Tyr	Val	Asp	Arg	Leu	Tyr	Gly	Asn
225						230					235				240
Ala	Ile	Ala	Ser	Val	Gln	Thr	Asn	Phe	His	Lys	Asp	Thr	Ser	Arg	Asn
				245					250					255	
Glu	Lys	Phe	Tyr	Gly	Ala	Gly	Glu	Val	Asn	Cys	Arg	Tyr	Glu	Glu	Gln
			260					265					270		
Gly	Lys	Ala	Pro	Thr	Tyr	Val	Leu	Glu	Arg	Ser	Gly	Leu	Ala	Met	Thr
		275					280					285			
Asn	Tyr	Asn	Tyr	Asp	Asn	Leu	Asn	Tyr	Asn	Gln	Pro	Asp	Val	Val	Pro
	290					295					300				
Pro	Gly	Tyr	Pro	Asp	His	Pro	Asn	Tyr	Tyr	Ile	Pro	Met	Tyr	Tyr	Ala
305						310					315				320
Ala	Pro	Trp	Leu	Val	Val	Gln	Gly	Cys	Ala	Gly	Thr	Ser	Lys	Gln	Tyr
				325					330					335	
Ser	Tyr	Gly	Trp	Phe	Met	Asp	Asn	Val	Ser	Gln	Ser	Tyr	Met	Asn	Thr
			340					345					350		
Gly	Asp	Thr	Ala	Trp	Asn	Cys	Gly	Gln	Glu	Asn	Leu	Ala	Tyr	Met	Gly
	355						360					365			
Ala	Gln	Tyr	Gly	Pro	Phe	Asp	Gln	His	Phe	Val	Tyr	Gly	Asp	Gly	Asp
	370					375					380				
Gly	Leu	Glu	Asp	Val	Val	Lys	Ala	Phe	Ser	Phe	Leu	Gln	Gly	Lys	Glu
385						390					395				400
Phe	Glu	Asp	Lys	Lys	Leu	Asn	Lys	Arg	Ser	Val	Met	Pro	Pro	Lys	Tyr
				405					410					415	
Val	Phe	Gly	Phe	Phe	Gln	Gly	Val	Phe	Gly	Ala	Leu	Ser	Leu	Leu	Lys

420					425					430						
Gln	Asn	Leu	Pro	Ala	Gly	Glu	Asn	Asn	Ile	Ser	Val	Gln	Glu	Ile	Val	
435					440					445						
Glu	Gly	Tyr	Gln	Asp	Asn	Asp	Tyr	Pro	Phe	Glu	Gly	Leu	Ala	Val	Asp	
450					455					460						
Val	Asp	Met	Gln	Asp	Asp	Leu	Arg	Val	Phe	Thr	Thr	Lys	Pro	Glu	Tyr	
465					470					475					480	
Trp	Ser	Ala	Asn	Met	Val	Gly	Glu	Gly	Gly	Asp	Pro	Asn	Asn	Arg	Ser	
485					490					495						
Val	Phe	Glu	Trp	Ala	His	Asp	Arg	Gly	Leu	Val	Cys	Gln	Thr	Asn	Val	
500					505					510						
Thr	Cys	Phe	Leu	Arg	Asn	Asp	Asn	Ser	Gly	Lys	Pro	Tyr	Glu	Val	Asn	
515					520					525						
Gln	Thr	Leu	Arg	Glu	Lys	Gln	Leu	Tyr	Thr	Lys	Asn	Asp	Ser	Leu	Asn	
530					535					540						
Asn	Thr	Asp	Phe	Gly	Thr	Thr	Ser	Asp	Gly	Pro	Gly	Asp	Ala	Tyr	Ile	
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Gly	His	Leu	Asp	Tyr	Gly	Gly	Gly	Val	Glu	Cys	Asp	Ala	Ile	Phe	Pro	
565					570					575						
Asp	Trp	Gly	Arg	Pro	Asp	Val	Ala	Gln	Trp	Trp	Gly	Glu	Asn	Tyr	Lys	
580					585					590						
Lys	Leu	Phe	Ser	Ile	Gly	Leu	Asp	Phe	Val	Trp	Gln	Asp	Met	Thr	Val	
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Pro	Ala	Met	Met	Pro	His	Arg	Leu	Gly	Asp	Ala	Val	Asn	Lys	Asn	Ser	
610					615					620						
Gly	Ser	Ser	Ala	Pro	Gly	Trp	Pro	Asn	Glu	Asn	Asp	Pro	Ser	Asn	Gly	
625					630					635					640	
Arg	Tyr	Asn	Trp	Lys	Ser	Tyr	His	Pro	Gln	Val	Leu	Val	Thr	Asp	Met	
645					650					655						
Arg	Tyr	Gly	Ala	Glu	Tyr	Gly	Arg	Glu	Pro	Met	Val	Ser	Gln	Arg	Asn	
660					665					670						
Ile	His	Ala	Tyr	Thr	Leu	Cys	Glu	Ser	Thr	Arg	Arg	Glu	Gly	Ile	Val	
675					680					685						
Gly	Asn	Ala	Asp	Ser	Leu	Thr	Lys	Phe	Arg	Arg	Ser	Tyr	Ile	Ile	Ser	
690					695					700						
Arg	Gly	Gly	Tyr	Ile	Gly	Asn	Gln	His	Phe	Gly	Gly	Met	Trp	Val	Gly	
705					710					715					720	
Asp	Asn	Ser	Ala	Thr	Glu	Ser	Tyr	Leu	Gln	Met	Met	Leu	Ala	Asn	Ile	

725										730					735				
Ile	Asn	Met	Asn	Met	Ser	Cys	Leu	Pro	Leu	Val	Gly	Ser	Asp	Ile	Gly				
			740					745					750						
Gly	Phe	Thr	Gln	Tyr	Asn	Asp	Ala	Gly	Asp	Pro	Thr	Pro	Glu	Asp	Leu				
		755					760						765						
Met	Val	Arg	Phe	Val	Gln	Ala	Gly	Cys	Leu	Leu	Pro	Trp	Phe	Arg	Asn				
		770				775						780							
His	Tyr	Asp	Arg	Trp	Ile	Glu	Ser	Lys	Lys	His	Gly	Lys	Lys	Tyr	Gln				
785					790					795					800				
Glu	Leu	Tyr	Met	Tyr	Pro	Gly	Gln	Lys	Asp	Thr	Leu	Lys	Lys	Phe	Val				
				805					810					815					
Glu	Phe	Arg	Tyr	Arg	Trp	Gln	Glu	Val	Leu	Tyr	Thr	Ala	Met	Tyr	Gln				
			820					825					830						
Asn	Ala	Thr	Thr	Gly	Glu	Pro	Ile	Ile	Lys	Ala	Ala	Pro	Met	Tyr	Asn				
		835					840					845							
Asn	Asp	Val	Asn	Val	Tyr	Lys	Ser	Gln	Asn	Asp	His	Phe	Leu	Leu	Gly				
		850				855					860								
Gly	His	Asp	Gly	Tyr	Arg	Ile	Leu	Cys	Ala	Pro	Val	Val	Arg	Glu	Asn				
865					870					875					880				
Ala	Thr	Ser	Arg	Glu	Val	Tyr	Leu	Pro	Val	Tyr	Ser	Lys	Trp	Phe	Lys				
			885					890						895					
Phe	Gly	Pro	Asp	Phe	Asp	Thr	Lys	Pro	Leu	Glu	Asn	Glu	Ile	Gln	Gly				
			900					905					910						
Gly	Gln	Thr	Leu	Tyr	Asn	Tyr	Ala	Ala	Pro	Leu	Asn	Asp	Ser	Pro	Ile				
		915					920					925							
Phe	Val	Arg	Glu	Gly	Thr	Ile	Leu	Pro	Thr	Arg	Tyr	Thr	Leu	Asp	Gly				
	930					935					940								
Val	Asn	Lys	Ser	Ile	Asn	Thr	Tyr	Thr	Asp	Asn	Asp	Pro	Leu	Val	Phe				
945					950					955					960				
Glu	Leu	Phe	Pro	Leu	Glu	Asn	Asn	Gln	Ala	His	Gly	Leu	Phe	Tyr	His				
			965					970						975					
Asp	Asp	Gly	Gly	Val	Thr	Thr	Asn	Ala	Glu	Asp	Phe	Gly	Lys	Tyr	Ser				
		980					985						990						
Val	Ile	Ser	Val	Lys	Ala	Ala	Gln	Glu	Gly	Ser	Gln	Met	Ser	Val	Lys				
		995					1000					1005							
Phe	Asp	Asn	Glu	Val	Tyr	Glu	His	Gln	Trp	Gly	Ala	Ser	Phe	Tyr					
	1010					1015					1020								
Val	Arg	Val	Arg	Asn	Met	Gly	Ala	Pro	Ser	Asn	Ile	Asn	Val	Ser					

1025		1030		1035
Ser Gln Ile Gly Gln Gln Asp Met Gln Gln Ser Ser Val Ser Ser				
1040		1045		1050
Arg Ala Gln Met Phe Thr Ser Ala Asn Asp Gly Glu Tyr Trp Val				
1055		1060		1065
Asp Gln Ser Thr Asn Ser Leu Trp Leu Lys Leu Pro Gly Ala Val				
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Ile Gln Asp Ala Ala Ile Thr Val Arg				
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 <213> Unknown

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 <223> fungus sp. or fungus infected gracilariopsis sp.

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Phe Ala Ala Pro Trp Val Ile Ala His Gly Tyr Arg Gly Thr Ser Asp				
	35		40	45
Gln Tyr Ser Tyr Gly Trp Phe Leu Asp Asn Val Ser Gln Ser Tyr Thr				
	50		55	60
Asn Thr Gly Asp Asp Ala Trp Ala Gly Gln Lys Asp Leu Ala Tyr Met				
65		70		75
Gly Ala Gln Cys Gly Pro Phe Asp Gln His Phe Val Tyr Glu Ala Gly				
	85		90	95
Asp Gly Leu Glu Asp Val Val Thr Ala Phe Ser Tyr Leu Gln Gly Lys				
	100		105	110
Glu Tyr Glu Asn Gln Gly Leu Asn Ile Arg Ser Ala Met Pro Pro Lys				
	115		120	125
Tyr Val Phe Gly Phe Phe Gln Gly Val Phe Gly Ala Thr Ser Leu Leu				
	130		135	140
Arg Asp Asn Leu Pro Ala Gly Glu Asn Asn Val Ser Leu Glu Glu Ile				
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Val Glu Gly Tyr Gln Asn Gln Asn Val Pro Phe Glu Gly Leu Ala Val				
	165		170	175

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cgcaaaacca	atcgccctcaa	tgtatccatg	accgcattgt	cgcacaaaca	aacgggtact		180
gcgggtagta	cagacaatcc	ggacgggtatc	gactacaaga	cctacgatta	cgtcggagta		240
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atcactgtcc	agcatcccg	tcagggttcag	gtcacgtcat	acaacaacaa	cagctacagg		420
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ttcaagacca	gagttacgag	aaagtctgac	ggcaagggtca	tcattgaaaa	tgatgaagtt		660
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aacgctatcg	cttccgtcaa	caagaacttc	cgcaacgacg	cgggtcaagca	ggagggattc		780
tatggtgcag	gtgaagtcaa	ctgtaagtac	caggacacct	acatcttaga	acgcactgga		840
atcgccatga	caaattacaa	ctacgataac	ttgaactata	accagtggga	ccttagacct		900

cgcgcatcatg atgggtgccct caaccagac tattatattc caatgtacta cgcagcacct	960
tggttgatcg ttaatggatg cgccggtact tcggagcagt actcgtatgg atggttcatg	1020
gacaatgtct ctcaatctta catgaatact ggagatacta cctggaattc tggacaagag	1080
gacctggcat acatgggcgc gcagtatgga ccatttgacc aacattttgt ttacgggtgct	1140
gggggtggga tggaatgtgt ggtcacagcg ttctctcttc tacaaggcaa ggagttcgag	1200
aaccaagttc tcaacaaacg ttcagtaatg cctccgaaat acgtctttgg tttcttcag	1260
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 <213> Unknown

<220>
 <223> fungus sp. or fungus infected gracilariopsis sp.

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 <212> DNA
 <213> Unknown

<220>
 <223> fungus sp. or fungus infected gracilariopsis sp.

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 <212> DNA
 <213> Unknown

<220>
 <223> fungus sp. or fungus infected gracilariopsis sp.

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 <212> DNA
 <213> Unknown

<220>
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